LITERATURE CITED

BOWER, F. O. 1928. The Ferns (Filicales), III. Cambridge Univ. Press England.

CONARD, H. W. 1908. The structure and life history of the hay-scented fern Carnegie Inst. Washington. Publ. 94.

DELEVORYAS, T., and J. MORGAN. 1954. A further investigation of the morphology of Anachoropteris clavata. Amer. J. Bot. **41**: 192–203.

GWYNNE-VAUGHAN, D. T. 1903. Observations on the anatomy of solenostelic ferns. Part II. Ann. Bot. **17**: 689–742.

MICKEL, J. T. 1967. An advanced course in pteridophyte biology in Costa Rica. Amer. Fern. J. **57**: 145–161.

SURANGE, K. R. 1952. The morphology of Botryopteris antiqua with some observations on Botryopteris ramosa. The Palaeobotanist **1**: 420–434.

WAGNER, W. H., JR. 1963. Pteridophytes of the Mountain Lake area, Giles County, Virginia, including notes from Whitetop Mountain. Castanea **28**: 113–150.

WARDLAW, C. W. 1952. Phylogeny and Morphogenesis. MacMillan, London.

WEBSTER, B. D., and T. A. STEEVES. 1958. Morphogenesis in Pteridium aquilinum (L.) Kuhn-general morphology and growth habit. Phytomorphology **8**: 30–41.

DEPARTMENT OF SYSTEMATIC AND ENVIRONMENTAL BIOLOGICAL SCIENCES, UNIVERSITY OF CONNECTICUT, STORRS, CONN. 06268, AND DEPARTMENT OF BOTANY AND PLANT PATHOLOGY, IOWA STATE UNIVERSITY, AMES, IOWA 50010.

Marsilea maheshwarii, a New Species from Pondichery, India

BRIJ GOPAL

The genus *Marsilea* is represented in India by nine species,[1] most of which are restricted in distribution, *M. minuta* L. being the only species found throughout India. Endemism is of common occurrence throughout the genus. While examining collections of *Marsilea* from all over the country, I found that some collections

[1] Gupta, K. M. 1962. Marsilea. Botanical Monograph no. 2, C. S. I. R., New Delhi, India.

from Pondichery represented a new species, which is here named in honor of the late Professor P. Maheshwari.

MARSILEA **maheshwarii** Gopal, sp. nov.

Plantae aquaticae; rhizomata robusta, apice pubescentia; petioli longi; lamina lata, marginibus integris; sporocarpia aggregata 3 vel 4, interdum 2, petiolo adnata 2–5 mm a basi; pedicelli connati et ramosi, penitus adnati sporocarpio, eique aequilongi vel eo paulo longiores; sporocarpia 3.5–4.0 × 3.0–3.5 mm, lateraliter compressa, rotundata in fronte, horizontalia vel deorsum flexa; cornua bina, distincta, inferius quidem minutum et obtusum, superius vero longum et recurvum; sori 12–16; megasporae nullae vel aberrantes; microsporae aberrantes.

TYPE: Pondichery, India, from the paddy fields, *G. Thanikaimoni 992a* (Herbarium of the French Institute, Pondichery, CAL).

PARATYPES: *loc. cit.*, *G. Thanikaimoni 992b* (US), *992c* (K), *992d* (BAN).

Marsilea is well known for its morphological plasticity. For example, it is very difficult to distinguish between species growing submersed. However, the characters of the sporocarp are more stable and have largely been used in specific identifications. *Marsilea maheshwarii* is recognized mainly on the basis of sporocarp characters. Gupta (*loc. cit.*) recognized three groups in the genus which differ in the mode of attachment of the pedicel to the petiole. The *Quadrifolia* group is characterized by pedicels that are adnate to the petiole at one point, and until now has been represented in India only by *M. quadrifolia*, known from Kashmir alone. *Marsilea maheshwarii* from Pondichery has a similar attachment, which excludes any possibility of its being one of the *Minuta* group (like *M. minuta* or *M. coromandelica* Burm. f.), in which the sporocarps are always basal. The Pondichery material differs widely enough from *M. quadrifolia* to warrant its recognition as a new species.

Among the various characters, the mode of attachment of pedicel to pedicel, pedicel to sporocarp, and the shape of sporocarps in the two species are quite different (*Figs. 1, 2*). In addition, the shape of the horns, the aberrant microspores, and the usual absence of megaspores (aberrant if present) also contrast with

TABLE I. MORPHOLOGICAL FEATURES OF SPOROCARPS OF M. MAHESHWARII AND M. QUADRIFOLIA

Characters	*M. maheshwarii*	*M. quadrifolia*
Sporocarp number	3 or 4, sometimes 2	2 or 3, rarely solitary
Relation of pedicel to petiole	adnate, 2–5 mm above petiole base	adnate
Relation of pedicel to pedicel	connate ⅓–½ their length	connate ca. ½ their length, sometimes only at base
Shape and length of sporocarp	bean-shaped, compressed, not margined, not ribbed, 3.5–4 mm	oval, subcompressed, rarely margined, not ribbed, 5–6 mm
Pedicel disposition	obliquely ascending	decurved or somewhat ascending
Pedicel : sporocarp ratio	1 : 1 to 1.5 : 1	2 : 1, sometimes up to 3 : 1
Sporocarp surface	densely hairy, glabrate at maturity	strigose
Relation of pedicel to sporocarp	fully adnate	adnate
Number and nature of horns	2, lower small and blunt, upper long and recurved, sometimes broken at maturity	2, almost similar
Number of sori	12–16	16–20
Sporocarp contents	microspores aberrant, megaspores absent or aberrant	normal

M. quadrifolia. Vegetative characters were compared in the two species and also in *M. minuta* grown under exactly identical conditions (both submersed and dry). *Marsilea maheshwarii* is a stouter species than the other two. The leaflet margins remain almost entire under all conditions of moisture in *M. maheshwarii*, but

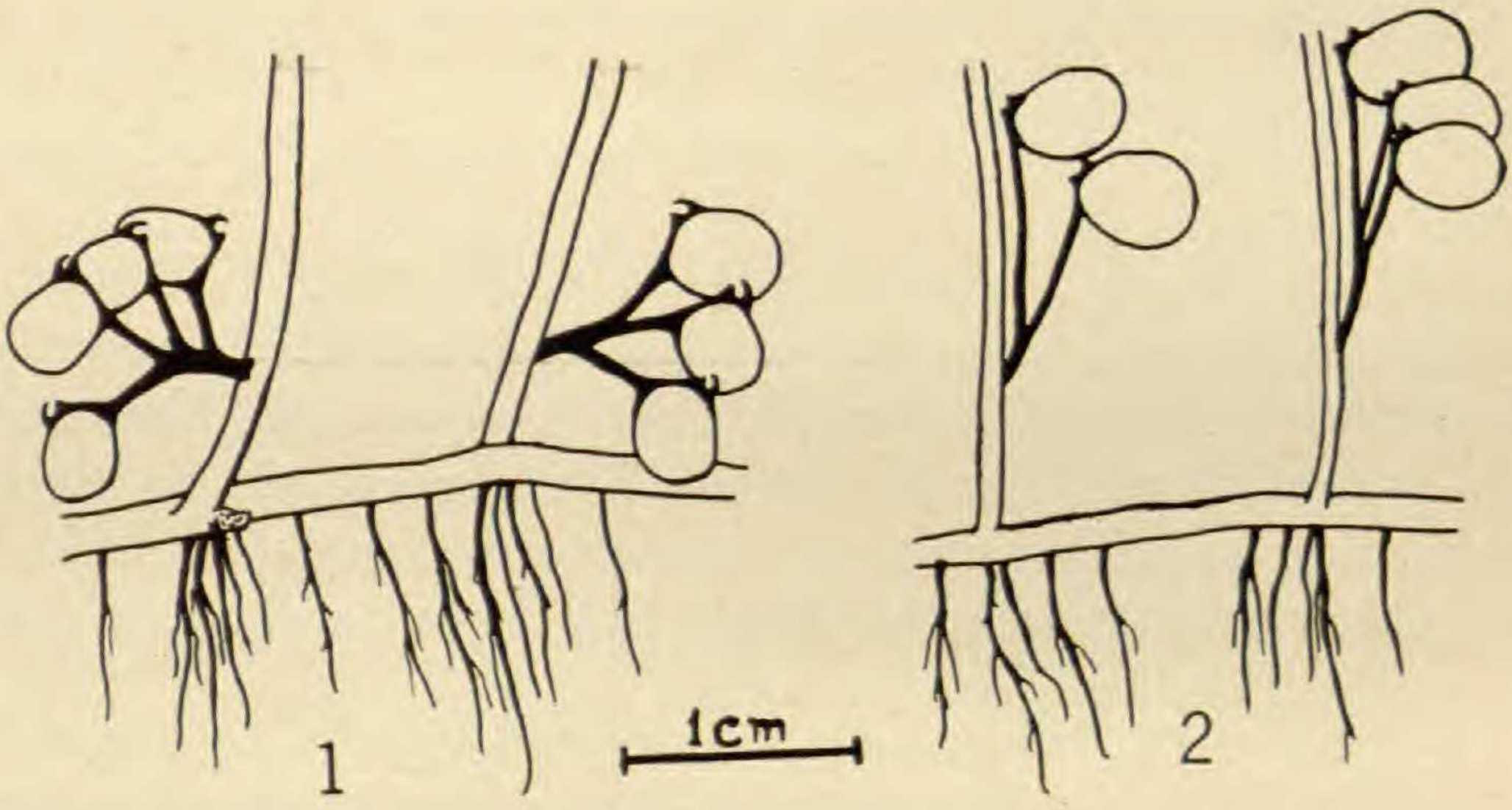

FIG. 1. PORTION OF A RHIZOME OF MARSILEA MAHESHWARII SHOWING DISPOSITION OF SPOROCARPS. FIG. 2. SAME, M. QUADRIFOLIA.

they become crenate in the other species under dry conditions. The various characters of the two species are listed in *Table I*.

I am very much indebted to Mr. G. Thanikaimoni of the French Institute, Pondichery, India, for his valuable help in collecting the material for my study, and to Rev. Fr. H. Santapau, Director, Botanical Survey of India, Calcutta, for kindly providing the Latin translation of the description. Thanks are also due Prof. R. Misra and Dr. K. C. Misra of the Botany Department, Banaras Hindu University, for encouragement and facilities accorded me.

DEPARTMENT OF BOTANY, BANARAS HINDU UNIVERSITY, VARANASI—5, INDIA.